Space Weather Forecast

Issued on Friday, 22 July 2022 at 13:14 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Earth-directed Coronal Mass Ejection (CME) expected early tomorrow. G1/Minor Storms expected with G2/Moderate storms likely. Slight chance of Moderate flares (R1-R2 Radio blackouts) throughout.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Low over the last 24 hours with numerous Common-class flares. The largest of these was from a region which is now over the limb. There are currently seven sunspot regions on the visible disc. However, none currently display any significant size or magnetic complexity. An earlier flare was associated with a filament (arc of plasma) eruption, which produced a complex Coronal Mass Ejection (CME). This CME has since been analysed as being Earth directed. No other Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind showed the onset of a fast wind from two coronal holes. The wind speed rose gradually from background levels to elevated levels, now varying between 500-550 km/s. The IMF (interplanetary magnetic field) was mainly at moderate levels, but peaked at strong levels between 21/1440-2100 UTC. The north-south component varied strongly at first, but settled to vary mostly weakly after 21/2200 UTC. Geomagnetic activity was Quiet to Unsettled, with G1/Minor storm (Kp 5) intervals between 21/1500-2100 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Despite a large number of active regions, activity is expected to remain predominantly Low, with a slight chance of isolated Moderate class flares through the period.

Solar Wind / Geomagnetic Activity: Initially a coronal hole fast wind environment is expected with elevated wind speeds. Then either late today, or more likely early tomorrow, a CME is expected to arrive with strong wind speeds likely. Combined CME and fast wind effects are expected to last through Day 2 into Day 3 (23-24 July) before slowly declining into Day 4 (25 July). Geomagnetic activity is expected to be Unsettled to Active (Kp 3-4) for much of today, due to the fast wind effects, with a chance of isolated G1/Minor Storm (Kp 5) intervals at first. With the CME arrival overnight, G1/Minor Storms (Kp 5) are expected to develop, with G2/Moderate (Kp 6) storm intervals likely. There is also a slight chance of G3/Strong (Kp 7) storms occurring. During Days 3 and 4 a gradual decline in activity is expected, reaching Quiet to Unsettled conditions during Day 4.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to remain at background, with just a very slight chance of reaching S1/Minor Storm levels.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	40	80	20	5
Strong	G3	No	2	10	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	10	10	10
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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